

### **III. Rejections under 35 U.S.C. § 102**

Claims 1-4 and 30 were rejected as being anticipated by French Patent No. FR 2186955, issued to Roland Mas. Although the Examiner refers to Fig. 2 of Mas patent in the Office Action, Applicants assume that the Examiner meant to reference Fig. 1, as Fig. 2 appears to show only a cross-section of a portion of a tank. If this assumption is in error, Applicants request notification of such. This rejection is respectfully traversed.

Claim 1 of the instant application recites a system comprising a storage tank attachable to a seabed, at least one fluid channel having a first end inside of the tank, near the bottom of the tank and a second end in fluid communication with seawater outside of the tank, at least one offload line having a first end in fluid communication with the tank and a second end adapted to be fluid coupled to a tanker, and at least one hawser having a first end operatively coupled to the tank at a location below the water surface and a second end that is accessible from the water surface and attachable to the tanker. Claims 2-4 depend from claim 1 and thus include each of these limitations. Claim 30 also recites a system comprising a storage tank attachable to a seabed and having at least one offload line and at least one hawser, similar to the offload line and hawser of claim 1.

Embodiments of the invention in accordance with these claims may advantageously provide storage for offshore production so that quantities of hydrocarbons can be continually produced during adverse weather conditions independent of the availability of a tanker. In some embodiments, the present invention may be used to eliminate the need for costly deepwater pipelines. Furthermore, embodiments of the present invention may advantageously provide a system for maintaining the position of a tanker during offtake without placing mooring stress on a hose of the offload line, which could result in damage to the hose and release of hydrocarbons into the marine environment.

In contrast, referring to Fig. 1, Mas discloses a system for routing hydrocarbons from a tanker 22 by means of pumps 17 located on a surface dock 18, through an intake line 16, and into an undersea storage 3 where the hydrocarbons are routed into a pipeline 9 for transfer to shore facilities. Claims 1 and 30 of the present invention recite an offload line, for offloading

hydrocarbons from the storage and offtake system, and to a tanker. The intake line 16 of Mas neither discloses nor suggests the offload line recited in claims 1 and 30. Furthermore, the intake line 16 of Mas is coupled to a pumping station on a surface dock 18, and not to a tanker.

Again referring to Fig. 1 of the Mas patent, a cable or chain 24 connects the swivel ring 14 of the storage 3 to the surface dock 18. In contrast, the hawser of claims 1 and 30 has an end that is accessible from the water surface, attachable to a tanker, and adapted to anchor the tanker during offtake operations. Because the cable or chain 24 of the Mas patent is neither attachable to a tanker, nor adaptable to moor the tanker during an offload operation, it cannot disclose or suggest the hawser as recited in claims 1 and 30.

The apparatus disclosed by Mas requires an intermediate surface dock 18 in order to function in the manner disclosed. Removal of the surface dock 18 would render it inoperable in the manner describe. Accordingly, the Mas reference cannot anticipate, or render obvious, these claims.

In summary, Mas neither discloses nor suggests either the offload line, or the hawser, according to claims 1 and 30. For at least these reasons, claims 1 and 30 are patentable over this prior art reference. Claims 2-4, which depend from claim 1, are patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

#### **IV. Rejections under 35 U.S.C. § 103**

Claims 1-9, 11-17, 20-22, and 24-26 were rejected as being obvious over U.S. Patent No. 3,835,653, issued to Hix, Jr. ("Hix"), in view of U.S. Patent No. 4,182,584, issued to Panicker, et al. ("Panicker"). This rejection is respectfully traversed.

As noted above, claim 1 of the instant application recites a system comprising a storage tank attachable to a seabed, at least one fluid channel having a first end inside of the tank, near the bottom of the tank and a second end in fluid communication with seawater outside of the tank, at least one offload line having a first end in fluid communication with the tank and a second end adapted to be fluid coupled to a tanker, and at least one hawser having a first end operatively coupled to the tank at a location below the water surface and a second end that is

accessible from the water surface and attachable to the tanker. Claims 2-9, 11-17, 20-22, and 24-26 depend from claim 1 and thus include each of these limitations.

Hix discloses an underwater storage device having a cylindrical tank with a top closure and an open bottom. In one embodiment, the tank is attached to the sea bottom by cables (26). According to Hix, one end of the cables (26) is attached to the tank while the other end is attached to an anchor (28) embedded in the water bed. In this anchored embodiment, an oil inlet connection (24) is positioned along the midpoint of a wall (Fig. 2) and an oil outlet connection (18) is located at the top of a top portion (16). According to Hix, seawater entry and egress occurs through the open bottom (Col. 2, lines 31-33). The second embodiment disclosed by Hix also has an open bottom (Col. 2, lines 59-61) and is not anchored to the sea floor, being instead held in place by gravity (Col. 2, lines 47-49). The wall of the device is formed of a pair of cylindrical sheets (32a, 32b) that together form a concrete mold (Col. 2, lines 53-55). This device includes an oil inlet connection (42) and a water inlet (44). Any tanker using a tank according to Hix would require a separate mooring system.

Panicker discloses a free-standing marine production riser for use in deep water areas to conduct fluid between the marine bottom and the surface. As shown in Figs. 1 and 2, the riser system 11 is comprised of a lower rigid section 12 and an upper flexible section 16. As disclosed at Col. 3, ll. 27-40 and in Figs. 1-2, the flexible section 16 comprises flexible conduits which extend downward through catenary loops before extending upward to the surface of the water. To permit the flexible section 16 to be retrieved for reconnection, a tetherline 22 is attached at one end to the upper end of the flexible section 16 and at its other end to an anchor 20 retrievable from the water surface. No subsea storage is suggested or disclosed.

As noted by the Examiner, Hix fails to disclose a hawser, as recited in claim 1 of the instant application. Panicker also fails to disclose or suggest such a hawser. Furthermore, Panicker fails to disclose or suggest any type of mooring system at all. The tetherline disclosed by Panicker functions only to retrieve the flexible section of the riser system from a submerged position, to the water surface. The end of the tetherline that is maintained below the water surface is attached to the end of the flexible section of the marine riser system. Panicker explicitly states that this flexible section is to maintain at all times a catenary loop (see e.g. Col. 2, ll. 37-40). The purpose of this catenary loop (Col. 2, ll. 44-47) is to provide for minimum

stress on the flexible flowlines. Because such a configuration is incompatible with a mooring function, the tetherline according to Panicker is not adapted to anchor a tanker, as required by claim 1.

In summary, neither Hix nor Panicker discloses or suggests the hawser according to claim 1. For at least this reason, claim 1 is patentable over these prior art references. Claims 2-9, 11-17, 20-22, and 24-26, which depend from claim 1, are patentable for at least the same reason. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 10 and 19 were rejected as being obvious over Hix in view of Panicker, and further in view of U.S. Patent No. 4,138,751, issued to Kentosh. This rejection is respectfully traversed.

Claims 10 and 19 depend from claim 1 and therefore include each element recited in claim 1. Claim 1 of the instant application recites a system comprising a storage tank attachable to a seabed, at least one fluid channel having a first end inside of the tank, near the bottom of the tank and a second end in fluid communication with seawater outside of the tank, at least one offload line having a first end in fluid communication with the tank and a second end adapted to be fluid coupled to a tanker, and at least one hawser having a first end operatively coupled to the tank at a location below the water surface and a second end that is accessible from the water surface and attachable to the tanker.

As noted above, neither Hix nor Panicker discloses or suggests a hawser according to claim 1, and Panicker fails to disclose or suggest any type of mooring system. Kentosh also fails to disclose or suggest such a hawser. Furthermore, Kentosh teaches away from Panicker by requiring that the riser and buoy portions extend above the surface and including the "usual mooring structure 24 as well as warning lights 26" above the surface (Col. 2, ll. 12-13, 25-26), in contrast to Panicker's compliance with the "zone of turbulence" just below the surface, which is achieved by means of flexible sections, which are maintained in a submerged and flexible orientation. Thus, there will be no motivation to combine these two references. The "usual mooring structure" according to Kentosh is disposed above the water surface (see above, and Fig. 1), and therefore, any mooring line according to Kentosh will attach above the water surface (see reference 24 in Fig. 1), in contrast to the hawser of the instant claims, which is operatively

coupled to a tank at a location below the water surface. Furthermore, Kentosh also teaches away from the hawser of claim 1 by requiring such a mooring system.

In summary, this combination of references fails to disclose or suggest the hawser as recited in the instant claims. Furthermore, there would be no motivation to combine Kentosh with Panicker. For at least these reasons, claims 10 and 19 are patentable over the combination of Hix, Panicker, and Kentosh. Accordingly, withdrawal of this rejection is respectfully requested.

Claim 18 was rejected as being obvious over Hix in view of Panicker, and further in view of U.S. Patent No. 4,413,844, issued to N'guyen Duc, et al. ("Duc"). This rejection is respectfully traversed.

Claim 18 depends from claim 1 and therefore includes each element recited in claim 1. Claim 1 of the instant application recites a system comprising a storage tank attachable to a seabed, at least one fluid channel having a first end inside of the tank, near the bottom of the tank and a second end in fluid communication with seawater outside of the tank, at least one offload line having a first end in fluid communication with the tank and a second end adapted to be fluid coupled to a tanker, and at least one hawser having a first end operatively coupled to the tank at a location below the water surface and a second end that is accessible from the water surface and attachable to the tanker. Furthermore, the Examiner has provided no line of reasoning and the Applicants are aware of none, that would motivate one of ordinary skill to "pick and choose" the claimed features out of the cited references to achieve the Applicants' claimed invention.

As noted above, neither Hix nor Panicker discloses or suggests a hawser according to claim 18. Duc also fails to disclose or suggest such a hawser. Therefore, claim 18 is patentable over these prior art references. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 27-29 were rejected as being obvious over Hix in view of U.S. Patent No. 4,273,066, issued to Anderson. This rejection is respectfully traversed.

Claim 27 of the instant application recites a system comprising a storage tank attachable to a seabed, at least one fluid channel having a first end inside of the tank, near the bottom of the tank and a second end in fluid communication with seawater outside of the tank.

A tensioned riser is in communication at a first end with the tank proximal the top and connected proximal a second end to a subsurface buoy positioned at a desired depth, and a flexible hose that at a first end is coupled to and in fluid communication with the riser and at a second end is coupled to a surface buoy, accessible from the water surface, and adapted to fluid couple to a tanker. At least one hawser is shorter than the hose and is coupled at a first end to the riser and at a second end to the surface buoy, so that the hawser may attach to a tanker. A coupling device is provided between the second end of the riser and the first end of each of the hawser and hose, and weighted material is disposed in the tank. Claims 28-29 depend from claim 27 and include each of these limitations.

Embodiments of the invention in accordance with these claims may advantageously provide storage for offshore production so that quantities of hydrocarbons can be continually produced during adverse weather conditions independent of the availability of a tanker. In some embodiments, the present invention may be used to eliminate the need for costly deepwater pipelines. Furthermore, embodiments in accordance with these claims may advantageously provide a system for maintaining the position of a tanker during offtake without placing undue stress on the offload hose, which could result in damage to the offload line or storage tank and release of hydrocarbon into the marine environment. This is achieved by providing a hawser with a shorter length than that of the hose, so that mooring stresses are borne by the hawser (paragraph 41 of the specification) and not the hose. Finally, the use of a surface buoy advantageously provides for easy access to the hawser and offload line.

As previously discussed, Hix fails to disclose or suggest a hawser, as recited in these claims. Anderson fails to overcome the deficiencies noted in Hix. Rather, Anderson discloses a method of delivering oil from an offshore well to a storage tanker disposed on the water surface, including a mooring system having a buoyant riser tube (32) and an oil line (36) extending from a submarine well or production facility and running along or inside the riser tube (32). A mooring chain (42) extends from a spacer buoy atop the riser tube (32) and is attachable to a vessel. The chain can be attached to a windlass (see Fig. 3C) to adjust the tension in the chain. Because the chain is windlassed and stowed, it must necessarily have a greater length than the oil hose (44). This fact is readily apparent in Fig. 3C and Fig. 7A. Although a shorter hawser is depicted in Fig. 4 of Anderson, this is for the surface embodiment and does not disclose or

suggest that the hawser would operatively connect to a tank at a location beneath the water surface, as described at Col. 14, lines 20-40, and as required by claims 27-29. Because the instant claims require that the hawser be operatively connected to a tank at a location beneath the water surface, Anderson would not function as intended in such a configuration. Therefore, Anderson neither discloses nor suggests the hawser of the instant claims, which is shorter than the hose and operatively coupled to the tank at a location below the water surface. Furthermore, Anderson also fails to disclose or suggest a surface buoy, according to these claims.

With regard to the Examiner's comments that a hawser below the waterline is not recited in the rejected claims, Applicants respectfully disagree. Claim 27 explicitly states that a riser is attached at one end to a storage tank, and having a second end that extends to a selected depth below the water surface. A hawser is coupled at its first end to this second end of the riser, and is coupled at a second end to a surface buoy. Therefore, the hawser must be below the waterline. Claims 28-29 depend from claim 27 and therefore include this hawser.

In view of the above, Anderson and Hix fail to disclose or suggest at least the shorter hawser, and the surface buoy, as recited in claim 27. For at least these reasons, claims 27-29 are patentable over these two prior art references. Accordingly, withdrawal of this rejection is respectfully requested.

Claim 23 was rejected as being obvious over Hix in view of Panicker, and further in view of U.S. Patent No. 3,645,415, issued to Phelps. This rejection is respectfully traversed.

Claim 23 depends from claim 1 and therefore includes each element recited in claim 1. Claim 1 of the instant application recites a system comprising a storage tank attachable to a seabed, at least one fluid channel having a first end inside of the tank, near the bottom of the tank and a second end in fluid communication with seawater outside of the tank, at least one offload line having a first end in fluid communication with the tank and a second end adapted to be fluid coupled to a tanker, and at least one hawser having a first end operatively coupled to the tank at a location below the water surface and a second end that is accessible from the water surface and attachable to the tanker. Furthermore, the Examiner has provided no line of reasoning and the Applicants are aware of none, that would motivate one of ordinary skill to "pick and choose" the claimed features out of the cited references to achieve the Applicants' claimed invention.

As noted above, neither Hix nor Panicker discloses or suggests a hawser according to claim 18. Phelps also fails to disclose or suggest such a hawser. Therefore, claim 18 is patentable over these prior art references. Accordingly, withdrawal of this rejection is respectfully requested.

**V. Conclusion**

Claims 1-30 have been shown to be allowable over the prior art. Applicants believe that this paper is responsive to each and every ground of rejection cited by the Examiner in the Action dated March 19, 2003, and respectfully requests favorable action in the form of a Notice of Allowance. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 06558.011001).

Respectfully submitted,

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Marked-Up Version of Paragraph 50 of the Specification

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Embodiments of a storage and offtake system may be used in conjunction with a subsea processing and/or gathering system as illustrated in Figures 7 and 8. For example, the subsea processing system may comprise a subsea oil and gas separator 136 for degassing liquid hydrocarbons produced from the subsea wells 132 (in Figure 7). An example of a subsea processing system is described in U.S. Patent [Application] No. [\_\_\_/\_\_\_\_\_] 6,537,349 [filed on \_\_\_\_\_] issued to Choi et al., and entitled "Passive Low Pressure Flash Gas Compression System". As shown in Figure 8, when an embodiment of the invention is used with a subsea processing system, gas 134 separated from the liquid hydrocarbons may be routed to a gas handling system and the liquid hydrocarbons (oil) 121, exiting the separator 136 at a lower pressure can then be pumped via oil transfer pumps 135 into the inlet 122 of the tank 100.

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